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EXAMINER
LIANG, GWEN

ART UNIT	PAPER NUMBER
2172	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/599,735	Applicant(s) WATANABE ET AL.	
	Examiner GWEN LIANG	Art Unit 2172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,14-18 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14-18 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This action is responsive to communications: Amendment B, filed on 10/17/02. This action is made final.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 14, 15, and 20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 1, 14, 15 and 20, the newly added feature "a frame which integrates said disk storage media and said control unit into a single integrated package" was not disclosed in the specification.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969) and further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage).

With respect to claim 1, Ram discloses a disk unit ...comprising:

disk storage media for storing data (Abstract, "Each FSP is also connected to one or more disk controllers which in turn manage one or more data storage device.";

a control unit which includes a memory for storing a function and function information relating to execution of the function that are sent from the server, (col. 1 lines 59-64, "The present invention relates to a bridge in a file server which provides a direct link to data storage devices in satisfaction of data requests. The file server has one or more function-specific processors, including network processors (NPs) and file storage processors (FSPs) ..."); (col. 2 lines 9-16, "During operation, client requests are received and analyzed by NPs, and if acceptable, relayed to one of the FSPs which manages [through the use a control unit is inherent] a virtual file system [disk storage media] of mass storage devices connected to the FSP. The local FSP processor determines the location of a buffer on the requesting NP for storing data to be transmitted and instructs the disk controller [control unit] so that data retrieved by data storage devices is directly deposited into the buffer on the NP over the interconnect bus via the bridge."); (col. 2 lines 20-24, "Upon receipt of the instruction [Storing the function sent from the server in the memory is inherent.], the disk controller [control unit] causes data storage devices to retrieve the requested data [execute the function] and sends the result directly to the buffer of the requesting NP via the bridge. The requesting NP in

turn packetizes the result and sends the packets to the requesting client."); (col. 7 lines 33-39, "... the metadata cache [memory] includes information on the type and access mode [Access restriction is inherent.] for the file, the file's owner, the group access identifier, ..., among others."); (col. 8 lines 35-48, "The placement of the XOR engine 296 in the data path allows XOR operations to be performed on the fly without processor intervention [without server process] , thus improving RAID throughput and reducing the RAID write bandwidth load ... The access modes to the bridge buffer 230 that can be selected by address decoding include: Transparent(R/W) mode which is a transparent access to or from the entire bridge buffer 230. It can be used for diagnostic access or transferring unmodified data. [access control]").

However Ram does not explicitly teach a frame which integrates said disk storage media and said control unit into a single integrated package, wherein said control unit executes the function in response to a function execute request from the client computer and restricts, based on the function information, accesses from external of said disk unit to the data stored in said disk storage media during execution of the function.

Riedel discloses a frame which integrates said disk storage media and said control unit into a single integrated package (See for example: page 3 lines 6-8, "The technology is at a point where it becomes feasible to combine the drive control microprocessor with the specialized ASIC responsible for the balance of the drive's processing into a single chip."; Figure 1 – On-Drive Processor.)

wherein said control unit executes the function in response to a function execute request from the client computer and restricts, based on the function information, accesses from external of said disk unit to the data stored in said disk storage media during execution of the function (See for example: .page 5 lines 5-14, "Allowing such **filter functions** to operate directly at drives, close to the data, and **returning only the relevant fraction of the data to the client**, can significantly reduce network utilization and improve overall throughput. In addition to reducing network traffic, applications that scan large objects looking for specific properties or gathering statistics (e.g. counts of matching values) can take advantage of the computational power available at drives by performing these simple operations directly on the drives, thereby offloading the host and increasing the aggregate system power. Applications that fall into this category include text search (e.g. grep), database select, image processing and extraction, association matching for data mining, and spatial data extraction, i.e. any relatively simple function with the potential to significantly decrease the amount of network traffic or host processing required."; page 7 paragraph 4 lines 6-9, "The second function is a scan ( ) which also operates like read ( ) but uses the results of the sample step to provide only data in a specific key range to the requesting client. The scan reads data sequentially from the disk surface, but returns only records in the key range for this client. All other records are stored in on-drive cache buffers until the client responsible for those records issues a request.", wherein in order to provide only data in a specific key range to the requesting client, restricting access to the data is inherent; page 9 paragraph 2 lines 9-11, "Protecting data integrity in the face of remote programs can be

achieved by requiring remote functions to have capabilities and use the existing system to authorize their access to data objects on the drive.")

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a control unit as disclosed by Riedel in the disk unit as disclosed in Ram ". This allows devices more freedom to provide efficient operations; promises more scalable subsystems by offloading file system and storage management functionality froth dedicated servers; ... application-specific code can be executed at storage devices to make more effective use of device, host and interconnect resources and significantly improve application 1/O performance. Remote execution of code directly at storage devices allows filter operations to be performed close to the data; enables support of timing-sensitive transfers and application-aware scheduling of access and transfer; allows management functions to be customized without requiring firmware changes; and makes possible more complex or specialized operations than a general-purpose storage interface would normally support." (Abstract). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim 2 is rejected for the reasons set forth hereinabove for claim 1 and furthermore Riedel teaches that the function is a selection or extraction process in a database (page 6, section 3.1 Database select).

Claim 3 is rejected for the reasons set forth hereinabove for claim 1 and furthermore Ram discloses a disk unit wherein the function is a direct data transfer between the client and disk units without passing through the server (Abstract, "The

bridge provides a path between the FSP's internal buses so that, for disk access requests, data from a particular data storage device may be sent by the disk controller via the bridge over the interconnect bus to the NP servicing the request ..."); (col. 2 lines 30-32, "... the bridge provides a direct path between the client and file storage processors which eliminates unnecessary intermediate data routing.").

Claims 15-17 are similarly rejected on grounds corresponding to the reasons given above for claims 1-3.

Claim20 is similarly rejected on grounds corresponding to the reasons given above for claim 1.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kanai et al., "Kanai" (U.S. Patent No. 5,862,403) and further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage).

With respect to claim 14, Kanai discloses a disk unit ...comprising:

disk storage media to store data (col. 1. 63-64, "The data memory devices 702 for storing the continuous data are usually provided in forms of disk device."); and

a control unit, wherein said control unit receives function execute requests and user ID information from a client unit via a network and wherein based on said user ID information, creates function information to restrict the access area for data stored in said storage media at each function execute request (col. 1 lines 59-60, "The central control device 10 [equivalent to a control unit] is a device for coordinating the control of the system as a whole ..."); (col. 13 line 66 – col. 14 line 2, "Thus, the central control device may receive the access requests [function execute requests] either directly from

the external of the apparatus, or through the communication control device 6."); (col. 14 lines 9-14, "As the specification of the continuous data, besides the information for identifying each continuous data such as the continuous data name or ID code, ... can be specified."); (col. 14 lines 15-24, "In outline, the central control device 10 admits the access request [Access restriction is inherent.] for the continuous data from a user [In order for the central control device to admit the access request from a user, it is inherent that the request will be at least partially based on the user ID.] or an application program that is notified by means of a communication via a network,... etc., checks the data memory control device 4 and the communication control device 6 to be used in order to respond to that request, and issues to them commands [creates function information and passes over] for the operations necessary in transferring the requested continuous data [wherein access area restriction is inherent] from the communication path toward the specified transfer destination.").

However Kanai does not explicitly teach a frame which integrates said disk storage media and said control unit into a single integrated package, wherein said control unit restricts the access area based on said function information.

Riedel discloses a frame which integrates said disk storage media and said control unit into a single integrated package (See for example: page 3 lines 6-8, "The technology is at a point where it becomes feasible to combine the drive control microprocessor with the specialized ASIC responsible for the balance of the drive's processing into a single chip."; Figure 1 – On-Drive Processor.)

wherein said control unit based on user information, creates function information to restrict accesses from external of said disk unit to an access area for data stored in said storage media at each function execute request, and restricts accesses from external of said disk unit to the access area based on said function information (See for example: .page 5 lines 5-14, "Allowing such **filter functions** to operate directly at drives, close to the data, and **returning only the relevant fraction of the data to the client**, can significantly reduce network utilization and improve overall throughput. In addition to reducing network traffic, applications that scan large objects looking for specific properties or gathering statistics (e.g. counts of matching values) can take advantage of the computational power available at drives by performing these simple operations directly on the drives, thereby offloading the host and increasing the aggregate system power. Applications that fall into this category include text search (e.g. grep), database select, image processing and extraction, association matching for data mining, and spatial data extraction, i.e. any relatively simple function with the potential to significantly decrease the amount of network traffic or host processing required."; page 7 paragraph 4 lines 6-9, "The second function is a scan ( ) which also operates like read ( ) but uses the results of the sample step to **provide only data in a specific key range to the requesting client**. The scan reads data sequentially from the disk surface, but **returns only records in the key range for this client**. All other records are stored in on-drive cache buffers until the client responsible for those records issues a request.", wherein in order to provide only data in a specific key range to the requesting client, restricting access to the data based on user information is inherent;

page 9 paragraph 2 lines 9-11, "Protecting data integrity in the face of remote programs can be achieved by requiring remote functions to have capabilities and use the existing system to authorize their access to data objects on the drive.")

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a control unit as disclosed by Riedel in the disk unit as disclosed in Ram ". This allows devices more freedom to provide efficient operations; promises more scalable subsystems by offloading file system and storage management functionality froth dedicated servers; ... application-specific code can be executed at storage devices to make more effective use of device, host and interconnect resources and significantly improve application 1/O performance. Remote execution of code directly at storage devices allows filter operations to be performed close to the data; enables support of timing-sensitive transfers and application-aware scheduling of access and transfer; allows management functions to be customized without requiring firmware changes; and makes possible more complex or specialized operations than a general-purpose storage interface would normally support." (Abstract). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim Rejections - 35 USC § 103

7. Claims 4, 5 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969), further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage) and further in view of Bakow et al., "Bakow" (U.S. Patent No. 6,058,394).

Claim 4 is rejected for the reasons set forth hereinabove for claim 1. However the combination of Ram and Riedel does not explicitly disclose a list that indicates the accessible area, and wherein said control unit restricts accesses for the data based on the list.

Bakow discloses a disk unit wherein the function information comprises a list that indicates the accessible area, and wherein said control unit restricts accesses for the data based on the list (Abstract, "A query [analogous to a function] is executed in a computer to retrieve data from a database stored on a data storage device. Under control of a manager server, one of a plurality of agent servers is selected to execute the query ..."); (col. 1 lines 47-48, "The definitions for SQL provide that a RDBMS should respond to a particular query with a particular set of data [In order for a particular set of data to be retrieved, it is inherent that a list of accessible area is included in the query.] given a specified database content ...").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate data access restriction based on a list of accessible area as disclosed in Bakow into the disk unit function as disclosed in the combination of Ram and Riedel so that a particular set of data can be retrieved through a RDBMS. (col. 1 lines 47-49). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim 5 is rejected for the reasons set forth hereinabove for claim 4 and furthermore. Ram disclose a list comprising attributes, such as read, and write, related to access restriction during function execution (col. 8 lines 43-48, "The access modes to

the bridge buffer 230 that can be selected by address decoding include: Transparent(R/W) mode which is a transparent access to or from the entire bridge buffer 230. It can be used for diagnostic access or transferring unmodified data.")

Claim 18 is similarly rejected on grounds corresponding to the reasons given above for claim 4.

8. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969), further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage) and further in view of Delo et al., "Delo" (U.S. Patent No. 6,363,499).

Claim 7 is rejected for the reasons set forth hereinabove for claim 1 and furthermore Ram discloses a disk unit wherein the control unit monitors whether execution of the function was performed successfully (col. 2 lines 20-23, "Upon receipt of the instruction, the disk controller causes data storage devices to retrieve the requested data and sends the result directly to the buffer of the requesting NP via the bridge [In order for the disk controller to send the result directly to the buffer of the requesting NP, monitoring is inherent.]"). However the combination of Ram and Riedel does not explicitly teach a process of restoring data stored in said disk storage media to its state prior to execution of said function in the case that execution of the function was not successful.

Delo discloses a process of restoring data stored in said disk storage media to its state prior to execution of said function in the case that execution of the function was not successful (col. 16 lines 14-18, "However, once the user decides not to ignore the

error, or that the retry is nor working, then the user must choose cancel on an error dialog box [user command], at which point the user is warned that "rollback " is about to occur and then "rollback " occurs.").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the process of execution failure recovery as disclosed by Delo into the function execution monitoring process as disclosed in the combination of Ram and Riedel to maintain data integrity to provide a method and system for rolling back a computer (See for example: col. 2 lines 34-36). One of ordinary skill in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Claim 9 is rejected for the reasons set forth hereinabove for claim 7 and furthermore Ram discloses a disk unit wherein said control unit does not overwrite non-updated data with data updated from the function execution, until the execution of the function is complete. (col. 7 lines 23-27, "In the bridge buffer 230, a memory buffer is partitioned into a metadata cache and a write cache, among others. The write cache buffers [wherein updated data are stored first] writes to the disk drives and thus enhances performance, since memory writes are a magnitude ... faster than disk writes [It is inherent that the updated data will be saved in the write cache memory buffer first and when the execution is over, the write cache will then write the memory updates to the disk, wherein the data has not been updated until this time.]").

Claims 8 and 10 are similarly rejected on grounds corresponding to the reasons given above for claims 7 and 9.

Claim 11 is similarly rejected on grounds corresponding to the reasons given above for claim 9.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ram et al., "Ram" (U.S. Patent No. 5,941,969), further in view of Riedel et al., "Riedel" (Active Disks – Remote Execution for Network-Attached Storage), further in view of Bakow et al., "Bakow" (U.S. Patent No. 6,058,394) and further in view of Fong (U.S. Patent No. 6,292,879).

Claim 6 is rejected for the reasons set forth hereinabove for claim 4. However the combination of Ram, Riedel and Bakow does not explicitly disclose a disk unit wherein said control unit abnormally terminates execution of the function in the case that an access occurs in violation of the access restriction.

Fong discloses a access control method wherein said control unit abnormally terminates execution of the function in the case that an access occurs in violation of the access restriction (col. 4 lines 22-27, "If access is violated, a protection fault results, and the program will not be allowed to continue its execution. FIG. 4 illustrates a method for checking operand data accesses using operand descriptors and terminating a process if access is violated.").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the access violation handling process as disclosed in Fong into the data access restriction based on a list of accessible area as disclosed in the combination of Ram, Riedel and Bakow so that when access violation occurs the process will be terminated for protection violation (col. 4 lines 5-7). One of ordinary skill

in the art would be motivated to make the aforementioned combination with reasonable expectation of success.

Response to Arguments

10. Applicant's arguments with respect to claims 1-11, 14-18 and 20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GWEN LIANG whose telephone number is 703-305-3985. The examiner can normally be reached on 9:00 A.M. - 5:30 P.M. Monday - Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KIM VU can be reached on (703) 305-4393. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

G.L.
December 12, 2002

KIM VU
SUPERVISORY PATENT EXAMINER
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